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Nitrogen Lasers and Dye Lasers

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This semester I have been working on making a nitrogen laser and a dye laser system operate. The nitrogen laser is used as the excitation source for the dye laser. In this case the nitrogen laser will be used to optically pump the lasing medium of the dye laser. One of the problems encountered in this project is the "Form factor" of the nitrogen laser output. This consists of a rectangular beam 40cm high by 20cm wide. However the dye laser requires a beam that is approximately 20cm wide by 10-20cm high in order to allow proper focusing of the nitrogen laser in the dye. This requires that the nitrogen laser beam be compressed. To accomplish this, two converging lenses have to be used to shape the emitted light. Two lens holders and a mounting piece had to be manufactured from three circular pieces of aluminum. The mounted lenses rotate and refocus the rectangular beam emitted from the nitrogen laser causing the dye to become excited and lase. The advantage of a dye laser is that the output wavelength of the dye can be varied. Once the dye laser is operating, the wavelength output range of the laser will be determined and applications developed. One possible application involves examining chemical reaction rates and kinetics by probing the reacting species using specifically tuned laser wavelengths. In this presentation, I will discuss the basic principles of a nitrogen laser and a dye laser system and the techniques used to shape the nitrogen laser beam for input into the dye laser.